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CONSONANT ASSIMILATION AND SONORITY: A CASE STUDY IN DAASANACH*

1 INTRODUCTION: CONSONANT COOCCURRENCE AND DELETION IN DAASANACH

I consider consonant assimilation and deletion in the East-Cushitic language Daasanach. I will argue that the constraints relevant to the sonority motivate the assimilation and deletion of the consonant sequences across morpheme boundaries (Gnanadesikan 1997).

Sasse (1976) and Tosco (2001), two of the few works on the East-Cushitic language Daasanach, introduce consonant assimilation in morpheme boundaries:

(1) {n, l}+t → {nn,ll}
{r, d}+t→t͡t
{s, t}+t→t

(Tosco 2001: 23)

However, according to Tosco (2001), such sequences of the consonants are allowed by accordance with the Sonority Sequences:

(2) L>N>F>S[Cor]>S[-Cor]
(L: liquids, S: stop, N: nasal, F: fricative)
(Tosco 2001: 52)

The above Sonority Sequences do not explain why the allowed sequences are assimilated. For example, the /st/ sequence is accepted in (2), but the following gradation occurs:

(3) st→t
/fwʁa + vkl → [fwwvk]

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fart Perf ‘farted’

Moreover, it is not consistent as to which consonant undergoes deletion or assimilation. The deleted consonant is not always more sonorous or less sonorous as in (4), or in the stem or in the affix:

(4) t+s→s

1ikʉ	+	uw1→	[ikʉw]
tear apart		Middle	‘to tear off for oneself’

(Tosco 2001: 24)

I present the data that the above Sonority Sequences concern only morpheme internally, and different grammar rules the morpheme boundaries and result in the conosonant assimilation in Daasanach.

Specifically, the following factors contribute to determining the realization of consonants:

- The avoidance of obstruent sequences
- The preference for sonorants
- The preference to retain consonants in the affix

The construction of this paper is as follows: section 2 discusses the CC (consonant) sequences within morphemes, and section 3 will demonstrate that different grammars explain the CC sequences across morpheme boundaries. Section 4 investigates the consonant assimilation and deletion which exemplify the highly ranked constraints that determine the phonological realization in Daasanach (Prince and Smolensky 1993).

2 CC SEQUENCES WITHIN MORPHEMES

In this section, I examine the cases of CC sequences within morphemes, and explain that the preference for the syllable structure dominates the sonority based constraint.

The following patterns of consonant clusters are allowed within morphemes in Daasanach:

(5) Sonorant+Sonorant

a. L+L: 1tn1 octnk

	1oct	+ nk1
	Arbore	Fem
	‘Arbore’	

b. L+N: 1no1 Îqnokʉw

	1Îqnkʉ	+ okuq1
	peep	Nasal-ext Intensive

		‘to peep’
	1to1	pkto
		‘newborn camels’
	1tp1	mgɮpɋ
		‘bottom backbone’

(6) Sonorant+Obstruent

a. L+F:	1tu1	mctuke
		‘old, elder’
		(monomorpheme)
	/nu1	dcnuco
		dcnv + uco
		grass Pl
		‘kind of grass’
b. L+C[1]:	1nv1	dknvk
		dknv + g
		knife-Sg Def
		‘the knife for circumcision’
c. N+F:	1pu1	mcpuke
		‘chief’
		(monomorpheme)
d. N+C	1pv1	ikpvk
		ikpvk + g
		gazelle Def
		‘the gazelle’

(7) Obstruent+Sonorant

C+N	1Î̂o1	fwÎ̂oq
		fwfwo + q
		calabash Pl
		‘round calabashes’
	/fp1	mqPqɮpqu(
		mqPqfpq + u(
		bend Caus Mid
		‘to make someone bend for himself’

(8) Obstruent+Obstruent

C+F	1fh1	mwÎ̂hw
		mwÎ̂h + q
		ankle Pl
		‘ankles’[2]

Based on the above data, Tosco generalizes the cooccurrence restriction as follows:

[1] ‘C’ refers to a plain stop in Tosco (2001).

[2] The data given in (5)–(8) are based on Tosco (2001: 52-53). Some of them were corrected by the native speaker. The decomposition was added by the author based on the information given by the informant.

(9) Cooccurrence restriction (Tosco 2001)

$$\left\{ \begin{array}{l} \{F, C\} \\ \{N\} \\ \{L\} \end{array} \right\} \quad + \quad \left\{ \begin{array}{l} \{F, N\} \\ \{[F]^3, C\} \\ \{L, F, N, C\} \end{array} \right\}$$

(L: liquids, C: plain stop, N: nasal stop, F: fricative)

In accordance with the above cooccurrence restriction, Tosco proposes the following hierarchy:

(10) L>N>F>S[Cor]>S[-Cor]

(L: liquids, S: stop, N: nasal, F: fricative)

(Tosco 2001: 52)

However, the data given in (5)-(8) do not suggest any ordering between N, F and C, since the cooccurrences of N+F, F+N, N+C, C+N, N+C, C+F are all allowed.

(11) L>N, F, C

On the other hand, N, F, C + L consequences are never found.

(12) *N, F, C >L

It is only liquids that strictly obey the cooccurrence restriction.

As for gemination, which is frequent in Daasanach (Sasse 1974: 409), the above listed consonants also geminate:

(13) GG[4]: {{. yy
LL: nn. tt
NN: oo. pp
FF: FF
CC: ii. ff. dd. vv. óó

As exemplified in the free order between the consonants except for the liquids, the Syllable Contact Law (Vennemann 1988) is not obviously most highly ranked:

(14) Syllable Contact Law:

A syllable contact A$B[5] is the more preferred, the less the consonantal strength of the offset A and the greater the consonantal strength of the onset B.

(Vennemann 1988: 40)

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[3] Tosco (2001) puts 'L' instead of 'F' as the coocurring consonant of nasals, which is obviously an error, according to the given data.

[4] 'G' stands for glides.

[5] 'A' and 'B' represent segments, and '$' stands for a syllable boundary.

CONSONANT ASSIMILATION AND SONORITY:
A CASE STUDY IN DAASANACH

Since the concept of sonority is more commonly used instead of consonantal strength currently, I adopt the wordings of Bat-El (1996), following Davis and Shin (1999):

(15) Syllable Contact Law (sonority version):
A syllable contact A$B is the more preferred, the more the sonority of the offset A and the less the sonority of the onset B.

(16) Syllable Contact (SyllCon):
The onset of a syllable must not be of greater sonority than the last segment in the immediately preceding syllable." (That is, avoid rising sonority over a syllable boundary.)
(Bat-El 1996: 304)

The sequence of Obstruent + Sonorant violates the SyllCon. Even violating the Sonority Hierarchy and SyllCon, *Complex and Onset are adhered to.

(17) *Complex:
*[$_{\sigma}$CC ('Onsets are simple.')

(18) Onset
*[$_{\sigma}$V ('Syllables must have onsets.')
(Kager 1999)

The preference for the CV syllable structure comes to the fore, and so does the avoidance of the complex onset.[6]

Tableau 1
CC Sequences within Morphemes

(2c) Input: /mctuke1	*Complex	Onset	SyllCon
☞mct0uke			
mc0tuke	*!		
mctu0ke		*!	
(3) Input: /fwÎo+q1			
☞fwÎ0oq			*
fw0Îoq	*!		
fwfo0q		*!	
(4) Input: /mwÎh+q1			
☞mwÎ0hw			*!
mw0fhw	*!		
mwfh0w		*!	

[6] The syllabification of the winning candidate is in accordance with the informant's intuition who is confident that the CC sequence cannot be either a complex onset or a complex coda.

3 CC SEQUENCES ACROSS MORPHEME BOUNDARIES

In this section, I investigate the possible CC sequences across morpheme boundaries, which we find to be more restricted than those within morphemes. In particular, Obstruent+Obstruent combination is not found in morpheme boundaries.

The following CC sequences occur in Daasanach:

(19) Sonorant+Sonorant

L+N

1no1	iwqnoqBw	
		iqnqB + oq + uw
		feed Nasal Middle
		'to feed oneself'

(20) Sonorant+Obstruent

a. L+F

1tu1	AqPqtuku(	
		AqPqt + uku(
		black Caus
		'make black'
1nu1	iqnqBuq	
		iqnqB + uq
		feed Mid
		'to feed oneself'

b. L+C

1tv1	Fwwtvk	
		Fwwt + vk
		hair Mid Perf
		'shaved oneself'

c. N+C

1pv1	Îwwpkpvk	
		Îwwpkp + vk
		mosquito Fem Sg
		'mosquito'

(21) Obstruent+Sonorant

a. F+N

1uo1	fwwuoc	
		fwwu + o+c
		fart Impf
		'to fart'
/Fo1	fkBFoc	
		fkBv + o+c
		refuse Impf

‘to refuse’

b. C+N

1fo1 uwiwEoku(

uwiwEku-
rub Nasal Ext
‘to rub’

In comparison with the CC sequences within morphemes, we find that the following sequence does not appear in a morpheme boundary but appears within morphemes:

- Obstruent + Obstruent

In fact, the avoidance of the obstruent sequence is realized as the deletion of the obstruent sequence, as we see in the next section. As for now, we detect the following constraint:

(22)* $C_{Obs}C_{Obs}$
Avoid a sequence of obstruents.

Tableau 2
CC Sequences across Morpheme Boundaries

(17a)Input: /fwwu+o+c1	*$C_{Obs}C_{Obs}$	*Complex	Onset	SyllCon
☞fwwu0oc				*
fww0uoc		*!		
fwwuo0c			*!	
Input: Obs-Obs				
Obs-Obs	*!			
☞ ?				

4 CONSONANT ASSIMILATION AND DELETION

Now I examine the consonant deletion and assimilation across morpheme boundaries.[7]

(23) Sonorant+Obstruent

a. G+C→G

y+ t→y

b. L+C→ L

l+ t→l

c. $L+C_{[-voice]} \rightarrow C_{[voice]}C_{[voice]}$

{r, d}+ t→t̂t̂

d. N+C→ N+N

{m, n, l}+ t →{nn,ll}

(24) Obstruent+Obstruent

a. F+C→C

s+t→t

b. C+F→F

t+s→s

c. C+C→C

t+ t→t

d. C+C→CC

d+ t→t̂t̂

The possible hypotheses are:

- The stem C remained
- The suffix C remained
- The most or least sonorous consonant remained
- A consonant before a V remained

As the data below shows, the conosonant deletion or assimilation occurs across the morpheme boudaries:

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[7] Based on the collected data, I added on the generalizations that Sasse (1976) and Tosco (2001) make:

`1v1` fully assimilates to preceding `1n.p.{1`

`1u1` fully assimilates to following `1v1`

`1ov1` and `1tv1` are fused to /nn, DD/ respectively.

(Sasse 1976)

{n, l}+t → {nn,ll}
{r, d}+t→t̂t̂
{s, t}+t→t

(Tosco 2001:23)

(25) G+C→G
y+ t→y
/|ccd{ + y+ c1→[|cc{c]
sew 2Sg
'you sew' (Sasse 1976)

(26) L+C→ L
l+ t→l
a. 1occn+v+c1→[occnc][8]
hear 2Sg
'(You) hear'
b. 1jKn + vc1→[jKncB]
enter 2Pl
'(YOU) enter'
c. /dkn+v+q1→[dknq]
bow Pl
'bows'

(27) L+C→CC
r+ t→Î Î
a. 1hwwt + v + c1 → [hwwDDA]
open- 2Sg
'you open' (Sasse 1976)
b. 1ekt + v + k1 → [ekBÎk]
hold Mid Perf Sg
'you held for yourself' (Tosco 2001:187)

(28) N+C → N+N
{m, n, l}+ t →{nn,ll}
a. /vwwp + v + c1 → [vwwppc]
beat 2Sg
'you beat'
b.1|cicu + co + v + c1 → [|cicucppc]
see 2Sg
'you see' (Sasse 1976)

(29) F+C→C
s+t→t
a. 1iwu + vg/ → [iwvg]
scoop Past Mid Sg
b./hwwu + vg/ → [hwwvg]
tear off Benefactive
c./jggu + v + k1 → [jggvk]
ask 2Sg Perf
'you asked'
d.1ÎkB + v + k1 → [Îkvk]

[8] Unless specified, the given data are collected from the informant.

build 2Sg Perf
'you built for yourself' (Tosco 2001:187)

e./fwBu + v + k1 → [fwwvk]
fart 2Sg Perf
'you farted' (Tosco 2001: 128)

(30) C+F→F
t+s→s
1ikB + uw1 → [ikBw]
tear apart Middle
'to tear off' (Tosco 2001: 24)

(31) C+C→CC
d+t→Î Î
/ocÎ + v + k1 → [ocÎÎk]
go and buy 2Sg Perf
'you went and bought'

If we suppose that the stem is retained, (29) and (30) are not predictable since the C in the affix remains. On the other way, positing the survival of the C in the affix does not harmonize with the data in (25)-(28) and (31) in which the C in the stem is retained. The remaining C is neither most nor least sonorous since (29) retains a stop over a fricative, and the other data retain the more sonorous C.

The last hypothesis that the C before V remains, in line with the assumption that the onset is perceptually more salient than the coda (Steriade 2001), does not hold, either, because (25)-(28) and (31) retain the coda, not the onset.

In view of the foregoing, none of the above hypotheses perfectly matches the given data. The hypothesis that the most sonorous C survives may appear to make the least violation since it only fails to predict (29).

Now, in the previous section, we have seen that the obstruent sequence is not realized across morpheme boundaries at all. Let us summarize the phenomena in question according to the distinction between the sonorants and the obstruents:

(31) CC sequences in morpheme boundaries:
a. Sonorant+Sonorant→Sonorant+Sonorant
b. Sonorant+Obstruent→Sonorant
c. Obstruent+Sonorant→Obstruent+Sonorant
d. $Obstruent_1$+$Obstruent_2$→$Obstruent_2$

The highly ranked constraint, *$C_{Obs}C_{Obs}$, eliminates the faithful candidate, that is, the obstruent sequence. However, we need a more strict constraint which do away with an obstruent which follows a sonorant and retains a sonorant as given in (31b).

(32) CC_{obs}
Avoid a sequence of a consonant followed by an obstruent

Next, the restriction placed on the sonorant deletion and the faithfulness condition on the affix rightly predict the outputs:

(33)Max-C_{son}-IO:
Input sonorant consonants must have output correspondents.

(34) Faith-affix-IO:
The output must preserve all segments present in the input affix.

Tableau 3
Consonant Assimilation across Morpheme Boundaries

Input: Son_1+Son_2	*CC_{Obs}	Max-C_{son}-IO	Faith-affix-IO
☞Son_1+Son_2			
Son_1		*!	*
Son_2		*!	
Input: Son+Obs			
Son+Obs	*!		
☞Son			*
Obs		*!	
Input: Obs+Son			
☞Obs+Son			
Obs			*!
Son			
Input: Obs_1+Obs_2			
Obs_1+Obs_2	*!		
Obs_1			*!
☞Obs_2			

Thus, the CC sequences across morpheme boundaries undergo the consonant assimilation due to the highly ranked constraints related to the sonority over the faithful candidate. The sonority-oriented constraints motivate the consonant assimilation.

Tableau 4
Consonant Assimilation across Morpheme Boundaries

(26a)Input: /occn+v+c1	* CC_{Obs}	Max-C_{son}-IO	Faith-affix-IO
occnvc	*!		
☞occnc			*
occvc		*!	
(27b)Input: /ekt+v+k1			
ektvk	*!		
☞ekʁk			*
ekʁk		*!	
☞ekʁ̂ɪ̂kʼ		*	
(28a)Input: /vwwp+vc1			
vwwpvc			
☞vwwppc			*
vwwvvc		*!	
(29e)Input: 1fwu+vk1			
fwuvk	*!		
fwuk			*!
☞fwvk			
(30)Input: /ikv+uw/			
ikʁuw	*!		
ikʁw			*!
☞ikʁw			

5 SUMMARY

In this paper, I examined the relation between the sonority and conosonant assimilation in Daasanach. The sequences of consonants are more freely allowed within morphemes than in morpheme boundaries, in that the sequence of the obstruents is not allowed and the retention of the sonorant is preferred across morpheme boundaries. Thus, the less sonorous consonant is deleted or assimilated. If both consonants are obstruents, the consonant in the affix remains.

[9] /r/ alternates with /ɾ̂ɾ̂/ (Tosco 2001: 23).

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